3.8 Master Files

A. Overview

Master files are used in the development and creation of Contract Plans for the purpose of bidding, constructing and inspecting a project. Master files are developed using the standard Caltrans roadway software (CAiCE) and standard drafting software (MicroStation).

Master files usually begin with the Surveys and Photogrammetry units. These units develop the mapping that depicts the existing conditions of the project in the Master Topographic file (also called the "**bb**" file). Design units then utilize this existing information to help develop the proposed permanent design information in the Master Design file (also called the "**aa**" file). These completed master files are generally separate MicroStation design files and together create what is referred to as the "base map" and serves as the basis for all of the plan sheets (i.e. Layouts, Drainage, Utilities, etc) within a project. This base map can then be referenced to any other MicroStation design file.

Referencing the base map is a very effective and efficient way of developing plan sheets. The base map remains unchanged as specific plan sheets are developed using all or portions of the base map. By referencing, only one base map needs to be created, but it can and should be utilized by the different functional design units. When any change is made to the base map (**changes should only be made by the unit responsible for the base map**), the change is automatically reflected in all the files that have the base map referenced to them (assuming the base map remains referenced and not copied into the Contract Plan Sheet).

The Master Clip Frame file, (which defines the appropriate area for each Contract Plan sheet), is generally referenced to the Contract Plan Sheet. The Master Plan Sheet file (which is the border sheet) is referenced to the appropriate Contract Plan Sheet file (which contains specific information only for that individual sheet). Once the design of the project is completed all sheet specific information, in any reference file, is then copied or clipped into the Contract Plan Sheet file.

B. Master Topographic Files

The Master Topographic File (also called the "**bb**" file) contains all data representing existing topographic features of the project. These features are located or positioned using California State Plane Coordinates. Usually this file remains static after the existing roadway features have been placed (Photogrammetry or Surveys usually provide this file). The topographic file contains existing natural and man-made features such as:

> Trees or natural vegetation, all public and private roads, curbs, edge of road, power and telephone poles, signs, sidewalks, underground and above ground utilities, manholes, fences, buildings, hydrographic features such as lakes, rivers, streams and natural channels, drainage and irrigation structures, and contours of the original terrain.

The Master Topographic file is developed using the Caltrans roadway software. Once completed it is then converted to a MicroStation design file, which can then be referenced to the Master Design file to assist designers developing the project. The District and EA should be part of the file name plus the letters "**bb**" (i.e. A12345bb.dgn).

C. Master Design Files

1. Overview

The Master Design file (also called the "**aa**" file) contains the design information that may be needed for the various Contract Plan Sheets (i.e. layouts, drainage, utilities, pavement delineation, stage construction, etc). These features are also located using California State Plane Coordinates. The design file contains the proposed work such as:

> Curbs, edge of road, relocated utilities, lights, signs, driveways, right of way lines, sidewalks, new utilities, drainage facilities, sound walls, retaining walls, guard railing, fences, toe of cut or toe of slope, alignment lines, centerlines, station ticks and annotation and sometimes striping. The Master Design file generally contains information that needs to be shown on each type of plan sheet (but not information specifically tied to one type of plan sheet).

Only the permanent physical design features (visible features that will become existing information for the next project or stage) should be placed in this Master Design file. The designer/design squad usually develops and maintains this file. The District and EA should be part of the file name plus the letters "**aa**" (i.e. A12345aa.dgn), which at this stage is usually a CAiCE project.

2. Utilizing the Master Design File in DGN Format

The Master Topographic file should always be referenced to the Master Design file during the course of developing a project. If the Caltrans CADD standards (particularly level, color, style and weight) are adhered to from the **inception** of the project, it is easier for any individual or functional design unit to utilize the design information in either master file more effectively and efficiently. Master files may contain a lot of information, but only the necessary information needed for any specific Contract Plan Sheet (for the bidding or constructing of the project), should be copied or clipped into that Contract Plan Sheet (active file). Too much information on a Contract Plan Sheet is just as bad as too little information.

After the Master Design file is completed using CAiCE, the pertinent graphic elements are then converted to a MicroStation Master Design file. **All** functional units involved in the project should be able to reference both the Master Topographic file and the Master Design file. Only surveys should make changes to the Master Topographic file while only the design unit handling the project should make changes to the Master Design file. The Master Design file should not be duplicated for the sake of duplicating it, but there are some specific situations where the Master Design file would be duplicated to accomplish a specific task.

Note: *the Master Topographic and Design files should stay referenced as long as possible before having specific information copied into the active file, thus changes made to the Master Topographic and Design files would automatically be reflected in all files referencing these files.*

Only one original Master Design file should be created (by the responsible design unit) and referenced by all functional units involved in the project. But depending on the size and complexity of a project, more than one Master Design file may be necessary. For example: pavement delineation plan sheets are usually modified to show the proposed roadway design information (new ETW, curbs, gutters, sidewalks and the alignment line when it is in conflict with a stripe line) as existing (dropped out) since the striping is the important information to show, not the completed road work. Copying the original Master Design file and modifying it for the pavement delineation plan sheets usually accomplishes this. Techniques such as level symbology or the use of special plotting functionality may be used instead of creating additional Master Design files.

The staging of a project may create the need for showing the previous stage as dropped out. Completed roadbed work from a previous stage **must** be shown as existing information (dropped out) for the next stage of work. A separate Master Design file for each stage is perhaps the simplest and most efficient way to display the design information correctly.

Through the years the naming of Master Design files once they are converted to a MicroStation design file has been left to the individuals creating them, since they were seldom saved after the project was submitted for PS&E. With the current emphasis on saving the Master Design file along with the Master Topographic file for future use, the **district** and **EA** should be included in the name as shown below:

Original Master Design File	A12345base.dgn
For PD plan sheets	A12345basen.dgn
Stage 2 plan sheets	A12345stage2.dgn
Stage 3 plan sheets	A12345stage3.dgn

The "A" in the file name represents the district code and the next 5 characters represent the project expenditure authorization.

The "base" in the file name refers to the original Master Design file (often referred to as the "base map").

For PD example above, the letter (n) represents the first letter of the Print Sequence Code for pavement delineation sheets. This helps in identifying the type of sheet the Master Design file (base map) is for.

The "stage 2" in the file name refers to the Master Design file (base map) that has been modified for the Stage 2 construction sheets.

If a specific type of work (i.e. irrigation layout or planting plan) needs to be shown in one MicroStation design file because of a specific workflow process, then a Functional Unit Master File may be needed. The "**aa**" and "**bb**" files should be referenced to the Functional Unit Master File while the specific type of work would be added to the Functional Unit Master File. Legend, notes, abbreviations, callouts, plus stations and identifying items of work should still be placed in the Contract Plan Sheet. The **district** and **EA** should be included in the file name along with the abbreviation or name of the Functional Unit or type of work (i.e. B98765planting).

At the completion of the design of the project, the **final** Master Design file may vary depending on the scope and specifics of each individual project. The Master Design file for the layout sheets usually serve as the final. When a project involves staging, the Master Design file for the final stage may be the final one. Some consider the Master Design file for the pavement delineation sheets to be the final one because the proposed roadway features are dropped out and ready to be utilized by a future project. But if a Master Design file is used for a future project, the right of way lines and alignment lines should be shown as solid lines (not dropped out).

Regardless of which Master Design file is considered the final, the districts should keep the Master Topographic file and the final Master Design file. It can be re-used on subsequent projects within the same work limits (i.e. landscape project or a local agency project) or for preliminary information in future planning documents. Archiving the Master Topographic file and final Master Design file allows another project to utilize the previous projects coordinate geometry and design information, thus saving time and effort. The information contained in these files **must** always be based on the California Coordinate System (CCS) – State Plane Coordinates.

Using the Contract Plans (layouts) to reconstruct the Master Design file with the correct coordinate geometry and then removing the extraneous information, is subject to more errors and will take significantly more time than utilizing an already archived Master Design file. If information needs to be exchanged between districts, local agencies or consultants, the Master Topographic file and Master Design file should be shared since the information is coordinately correct and there are no engineer signatures to be removed. Sometimes it may be more convenient to share (with outside agencies) the master files if they are merged into one MicroStation design file (especially if the Caltrans leveling convention has been adhered to).

Design files developed for advanced planning projects should be kept for all of the alternatives that were considered. For various reasons some projects are shelved for years, but if the design files were kept, the project can quickly be restored to the point it was put on hold.

D. Master Clip Frame Files

The Master Clip Frame file contains the clip frames (which reside in the Caltrans cell library) that create the maximum limits of the individual contract plans sheets. When initially positioning the clip frames, the Master Design file should be referenced to the Master Clip Frame file. Once completed, the Master Clip Frame file should be referenced to the Master Design file or the Contract Plan Sheet(s). Clip frames should not be placed in the Master Design file since clip frames are not design information.

If different plotting scales are needed for various plan sheets, more than one Master Clip Frame file may be needed. A Master Clip Frame file should contain only the clip frames for one plotting scale unless they cover different areas within the project limits.

A best practice would be to have a clip frame define the maximum area for a contract plan sheet and a second clip frame (one the user makes inside the maximum one) that defines the appropriate area to be displayed for that same contract plan sheet. The second clip frame would be used to define the match line between consecutive sheets.

E. Master Plan Sheet Files

The Master Plan Sheet file contains the appropriate border sheet for each registered engineer that is responsible for signing one or more plan sheet(s). The Master Plan Sheet file (border sheet) is referenced to the appropriate Contract Plan Sheet file and is referenced to as many Contract Plan Sheets that each registered engineer is responsible for. The border sheet should never be placed in the Master Design file.

There should be one Master Plan Sheet file for each registered engineer or licensed landscape architect that is responsible for signing one or more plan sheet(s). The Master Plan Sheet File contains the following information:

The registration information, signature of the registered engineer, approval date, expenditure authorization code and charge unit, name or initials of engineers involved in the project and the District/Route/Post Mile.

F. Contract Plan Sheet Files

The Contract Plan Sheet file is composed of information that is specific and unique to that particular plan sheet. The Contract Plan Sheet file generally contains descriptions, labeling, notes or symbology that defines or quantifies the items of work for that particular plan sheet. Any description that assists the bidding and constructing of the design features shown in the Master Design file should be placed in the Contract Plan Sheet file (plus stations, off-set distances, lane widths, etc).

Each Contract Plan Sheet file is a separate MicroStation design file (DGN). Each MicroStation design file for PS&E submittal requires an Interplot parameters file (see Chapter 5 of this manual). The Caltrans naming convention applies to each Contract Plan Sheet file submitted for PS&E (see Chapter 2, Section 2.2 of this manual).

The Master Topographic, Master Design, Master Plan Sheet, Master Clip Frame and Functional Unit Master files are referenced to the Contract Plan Sheet files during the development of the project. This allows a project, with various types of plan sheets, to be worked on at the same time while referencing the same files.

The delineation group usually maintains the Contract Plan Sheet files. Those Contract Plans depicting the design information in “plan view” (Layouts, Drainage, Utilities, etc.) should maintain the California Coordinate System – State Plane Coordinates from the Master Topographic and Master Design files. Quantity sheets and detail sheets (without “plan views”) do not have to adhere to the California Coordinate System. Information generally found on a typical Contract Plan Sheet file (layout, drainage, pavement delineation, etc) may contain information such as:

> Notes to the engineer, dimensioning, callouts, legends, notes, curve data information, plus stations, lane widths, abbreviations not found in the Standard Plans Manual, elevations, identifying items of work, limits of work or construction such as BEGIN or END REMOVE AC DIKE, and hatched regions outlining or designating work to be done such as COLD PLANE or REPLACE AC SURFACING.

Information that pertains to a specific sheet belongs in the Contract Plan Sheet file and not in the other Master Files.

G. Final PS&E Submittal

At PS&E submittal time, only the **necessary information** in the reference files is to be copied or clipped into the Contract Plan Sheet file. Contract Plan Sheet files, for PS&E submittal, **shall not** have any reference files attached. Each plan sheet is a snap shot of the information needed for review by DES-Office Engineer and then finalized as contract bid documents.